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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/286,099	04/02/1999	RAIMO BAKIS	YO999-046(87	4528

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EXAMINER	
ARMSTRONG, ANGELA A	
ART UNIT	PAPER NUMBER
2626	
MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	09/286,099	BAKIS ET AL.	
	Examiner	Art Unit	
	ANGELA A. ARMSTRONG	2626	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 October 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4,9-11,14-16 and 20-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *9-11,14-16 and 20-22* is/are allowed.

6)☒ Claim(s) *1,4* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This Office Action is in response to the amendment filed October 21, 2009, in which Applicant has amended claims 1, 9, 14-15, and 20, and has cancelled claim 19. Currently, claims 1, 4, 9-11, 14-16, and 20-22 are pending.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 1, 4, 9-11, 14-16, and 19-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hab-Umbach et al (US Patent No. 5,995,930) in view of Beutnagel (US Patent No. 6,078,885) in view of Naik et al (US Patent No. 5,548,647) and further in view of Abe (US Patent No. (US Patent No. 6,591,240).

2. Regarding claims 1 and 4, Hab-Umbach et al teaches a method and apparatus for performing speech recognition which implements generating a series of reference signals, which are one of a plurality of vocabulary words (which reads on applicants generating waveform for N sequences) at Abstract, col. 5, lines 20-30; col. 8, lines 21-32. Hab-Umbach does not specifically teach generating a synthetic waveform for each of N textual transcriptions of an original waveform, where N is greater than 1 and the textual transcriptions are generated by a speech recognition system and represents N-best textual transcription hypotheses of the original waveform. However it was well known in the art to implement generating synthetic speech of a

N-best text sequence for the purpose of reducing recognition errors due to decoding errors of acoustically similar words. Beutnagel teaches systems for updating dictionaries in a speech synthesis and recognition system and describes methods of scoring N-best pronunciations for given words and generate the words via a text-to-speech system as to score the candidates (col.1, lines 52-54) generating a synthetic waveform for multiple transcriptions at (col. 6, lines 20-30 and col. 8, lines 14-21 -- since the system can repeat the confirmation process with the second-best and third-best candidates). Additionally, Beutnagel teaches the text generated by a speech recognition system as a textual transcription at Figure 2, since 215 provide spoken word is fed to speech recognizer 205 and stress prediction 235. The output of the speech recognizer is input to a proposed pronunciation (no stress) 230, which is then combined with the proposed pronunciation with stress. The result of the combination is sent to the text-to-speech generator. It would have been obvious to one of ordinary skill at the time of the invention to modify the system of Hab-Umbach to implement generating a synthetic waveform for each of the N-best text sequences as described by Beutnagel, for the purpose of reducing recognition errors due to decoding errors of acoustically similar words.

Hab-Umbach further discloses dynamic programming (aligning) at col. 5, lines 31-33, Abstract, and Figure 2, element 26, but fails to specifically teach for each synthetic waveform, time-aligning feature vectors of the synthetic waveform with feature vectors of the original waveform at a phoneme level; computing a mean of the feature vectors which align to each phoneme for the original waveform and the synthetic waveform; computing a distance measure between each phoneme mean of the original waveform and the synthetic waveform; summing the distance measures to generate an overall distance measure representing a distance between

the original waveform and the synthetic waveform. Naik implements time alignment via dynamic time warping with Euclidean distance comparisons (col. 2, lines 23-53) and speaker normalization (col. 10, lines 35-56). It would have been obvious to modify the system of Hab-Umbach to implement the teachings of Naik for the purpose of improving performance and accuracy of the recognizer.

Hab-Umbach fails to teach implementation of a pitch synchronous overlap and add (PSOLA) technique. However, implementation of a PSOLA technique to modify pitch values in a speech synthesizer was well known in the art. Abe discloses pitch modification via implementation of a PSOLA technique (col. 4, lines 12-14). It would have been obvious to modify the system of Hab-Umbach to implement a PSOLA technique to generate the synthetic speech with pitch modification, as suggested by Abe, for the purpose of generating high quality natural sounding synthetic speech.

Comparing test signals to the reference signals (which reads on applicants comparing synthetic waveform to the original waveform) at abstract, col. 5, lines 20-30; col. 8, lines 21-32

Outputs the word or words having the best evaluation result based on the comparison at col. 8, lines 10-14 and lines 21-32

Vocabulary arranged in a tree structure based on phonemes (Viterbi) at col. 3, line 57 – col. 4, line 36 and Figure 1A.

Generates and retrieves values from spectral components of speech signal (feature vectors) at col. 8, lines 21-32

Computing individual scores, summing the scores and setting a new minimum score at col. 5, line 30 to col. 6, line 55

Repeating the process for every vocabulary word in the list (setting a parameter to n=1, retrieving the n-Th waveform and text sequence, incrementing the parameter by one, repeating the steps until each sequence has been considered) at Abstract, col.6, lines 56-58.

Response to Arguments

3. Applicant's arguments with respect to claims 1 and 4 have been considered but are moot in view of the new ground(s) of rejection.

Allowable Subject Matter

4. Claims 9-11, 14-16, and 20-22 are allowed.

5. The following is a statement of reasons for the indication of allowable subject matter: regarding claim 9, the prior art of record fails to specifically teach or disclose generating a score S from the overall distance measure D, an acoustic model score A of the corresponding textual transcription for the synthetic wave, and a language model score L of the corresponding textual transcription, wherein the score S = -D + (a * A) + (b * L), and 'a' and 'b' are constants.

6. Regarding claim 15, the prior art of record fails to specifically teach or disclose a comparator for comparing scores based on an overall distance measure between each synthetic waveform and the normalized original waveform, an acoustic model score of a corresponding textual transcription of the synthetic waveform, and a language model score of the corresponding textual transcription to determine a corresponding one of the N-best textual transcriptions to output.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANGELA A. ARMSTRONG whose telephone number is (571)272-7598. The examiner can normally be reached on Monday-Thursday 11:30-8:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richemond Dorvil can be reached on 571-272-7602. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Angela A Armstrong/
Primary Examiner, Art Unit 2626